

MIDDLE FORK GOODNEWS RIVER WEIR, 2003



By

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TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES	iv
LIST OF FIGURES.....	v
LIST OF APPENDICES.....	v
ABSTRACT	vi
INTRODUCTION.....	1
Salmon Fisheries.....	1
Escapement Monitoring and Escapement Goals	2
Project History	2
Site Description.....	3
Objectives.....	3
METHODS.....	4
Resistance-board Weir Operation	4
Escapement Estimates	5
Age-Sex-Length Composition Estimates	5
Atmospheric and Hydrological Monitoring	6
RESULTS.....	6
Weir Operations	6
Escapement Estimates	7
Age-Sex-Length Composition Estimates	7
Atmospheric and Hydrological Monitoring	8
DISCUSSION.....	8
Escapement Characteristics.....	8
Run Abundance.....	9
Age-Sex-Length Composition Estimates	9
CONCLUSIONS.....	10
Weir Operations	10
Fish Passage and Run Abundance	10
Age-Sex-Length Composition	10
RECOMMENDATIONS.....	11
Weir Operations and ASL Sampling	11
Fish Passage and Total Escapement Estimation.....	11
LITERATURE CITED	12
APPENDICES.....	34

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Daily and cumulative salmon passage, Middle Fork Goodnews River weir, 2003	15
2. Daily and cumulative passage of non-salmon species, Middle Fork Goodnews River weir, 2003	17
3. Daily fish carcass count, Middle Fork Goodnews River weir, 2003.....	19
4. Age and sex composition of chinook salmon escapement at the Middle Fork Goodnews River weir, 2003.....	21
5. Mean length (mm) of chinook salmon escapement at the Middle Fork Goodnews River weir, 2003.....	22
6. Age and sex composition of sockeye salmon escapement at the Middle Fork Goodnews River weir, 2003.....	23
7. Mean length (mm) of sockeye salmon escapement at the Middle Fork Goodnews River weir, 2003.....	24
8. Age and sex composition of chum salmon escapement at the Middle Fork Goodnews River weir, 2003.....	25
9. Mean length (mm) of chum salmon escapement at the Middle Fork Goodnews River weir, 2003.....	26
10. Age and sex composition of coho salmon escapement at the Middle Fork Goodnews River weir, 2003.....	27
11. Mean length (mm) of coho salmon escapement at the Middle Fork Goodnews River weir, 2003.....	28
12. Daily climate and hydrological readings, Middle Fork Goodnews River weir, 2003	29

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Map of the Goodnews River drainage	31
2. Chinook salmon migration timing at the Middle Fork Goodnews River weir.....	32
3. Sockeye salmon migration timing at the Middle Fork Goodnews River weir.....	32
4. Chum salmon migration timing at the Middle Fork Goodnews River weir.....	33
5. Coho salmon migration timing at the Middle Fork Goodnews River weir.....	33

LIST OF APPENDICES

<u>Appendix</u>	<u>Page</u>
A. Escapement summary for the Goodnews River drainage, 2003.....	35
B. Harvest summary for the Goodnews River drainage, 2003.....	36
C. Estimated total run abundance and exploitation for the Goodnews River drainage, 2003.....	37
D. Estimated run size and exploitation for chinook, sockeye, chum, and coho salmon in the Goodnews River Drainage, 1981-2003	38

ABSTRACT

Salmon returning to the Goodnews River support subsistence, commercial, and sport fisheries annually near the community of Goodnews Bay in Southwest Alaska. The Alaska Department of Fish and Game, in cooperation with the US Fish and Wildlife Service, operates an adult salmon weir on the Middle Fork Goodnews River, in an effort to ensure future sustainability of this resource.

A resistance-board weir was used to enumerate five species of Pacific salmon and Dolly Varden migrating into the Middle Fork Goodnews River in 2003. A total of 2,389 chinook, 44,387 sockeye, 21,637 chum, 1,192 pink, 52,810 coho salmon, and 1,949 Dolly Varden were observed passing the weir from June 18th through September 18th. A live trap was used to collect samples from chinook, sockeye, chum, and coho salmon throughout their respective runs, to characterize the age, sex, and length composition of each population. The chinook salmon run was 41.5% female and 44.1% age 1.3 fish. The sockeye salmon run was 45.6% female and 86.6% age 1.3 fish. The chum salmon run was 45.6% female and 84.5% age 0.3 fish. The coho salmon run was 44 % female and 87.1% age 2.1 fish.

Weir escapement, aerial survey, and harvest data were combined to estimate run abundances for the Goodnews River drainage. When compared with returns over the last 10 years the 2003 return was below average for chinook salmon, near average for sockeye salmon, and below average for chum salmon. Coho salmon run abundance was not estimated but commercial catch data from District W-5 and a high weir escapement suggest an above average return.

KEY WORDS: Goodnews River, Kuskokwim Area, Kuskokwim Bay, resistance-board weir, escapement monitoring, chinook salmon, sockeye salmon, chum salmon, pink salmon, coho salmon, Dolly Varden, *Oncorhynchus tshawytscha*, *Oncorhynchus nerka*, *Oncorhynchus keta*, *Oncorhynchus gorbuscha*, *Oncorhynchus kisutch*.

INTRODUCTION

Salmon returning to the Goodnews River support subsistence, commercial, and sport fisheries each summer near the community of Goodnews Bay in Southwest Alaska. The Alaska Department of Fish and Game (Department), in cooperation with the U.S. Fish and Wildlife Service (USFWS), operates an adult salmon weir on the Middle Fork Goodnews River (Middle Fork), in an effort to ensure future sustainability of this resource.

The Goodnews River drains an area of nearly 1000 square miles along the west side of the Togiak National Wildlife Refuge (Figure 1). It flows a distance of 60 river miles along its main stem, from the Ahklun Mountains southwest into Goodnews Bay. Two major tributaries, the Middle Fork and South Fork Goodnews Rivers, join the main stem a few miles from its mouth and are included within its drainage. In order to differentiate between them, the Goodnews River refers to all three drainages, and the Goodnews River upstream of its confluence with the Middle Fork will be referred to as the Goodnews River (north fork) or North Fork.

ADF&G has operated a counting tower from 1981 through 1990, and a weir since 1991 on the Middle Fork Goodnews River (Schultz 1982, 1984a, 1984b, 1985, 1987; Schultz and Burkey 1989; Burkey 1989, 1990; Menard 1998, 1999; Estensen 2002, 2003).

Salmon Fisheries

Subsistence and commercial fisheries occur in Goodnews Bay, and sport and subsistence fisheries occur in the Goodnews River drainage (Burkey et al. 1999). The Goodnews River is the primary spawning drainage for salmon caught in the Goodnews Bay commercial fishing district (District 5). Commercial fishing has occurred annually in District 5 since it was established in 1968. It is the southern most district in the Kuskokwim Area, which includes districts in Kuskokwim Bay and the Kuskokwim River. Permit holders have unrestricted movement between commercial fishing districts within the Kuskokwim Area, and fishers from distant villages often participate in the District 5 commercial fishery. The fishery is directed toward harvesting sockeye salmon *Oncorhynchus nerka* and coho salmon *O. kisutch* and is conducted from skiffs using hand pulled gillnets. Chinook salmon *O. tshawytscha* and chum salmon *O. keta* are harvested incidentally. Pink salmon *O. gorbuscha* is the least valuable species commercially and has not been targeted in recent years. The Department collects harvest data from fish buyers and processors. It also collects age-sex-length (ASL) data from commercially caught salmon in an effort to determine population characteristics.

The Goodnews River provides a vital subsistence fishery resource for the residents of the communities of Goodnews Bay and Platinum. Subsistence fishing is allowed throughout the Goodnews River drainage and in Goodnews Bay. Fish are most commonly taken with drift and set gillnets. The Department has quantified subsistence harvests in Goodnews Bay since 1977. Harvest estimates are made from interviews with subsistence fishers in October and November (Ward et al. 2003).

Sport fishing occurs throughout the Goodnews River drainage. Pacific salmon, Rainbow trout, Dolly Varden *Salvelinus malma*, Arctic char, and Arctic grayling are targeted. Many sport fishers take commercially guided or unguided float trips from lakes in the headwaters to the mouth at Goodnews Bay village. There are currently two commercially operated lodges with semi-permanent camps on the drainage that offer fishing from powered skiffs. The Department has been estimating sport fish harvests since 1991 (Lafferty 2004).

Escapement Monitoring and Escapement Goals

The Alaska Department of Fish and Game's Commercial Fisheries Division has operated a project to monitor salmon escapement into the Middle Fork Goodnews River since 1981. The project serves primarily as a management tool for the commercial and subsistence salmon fisheries in District 5, but also generates data relevant to the Goodnews River drainage as a whole. These data are used to make inseason management decisions, estimate drainage-wide escapement, and develop Sustainable Escapement Goals (SEG). The project also serves as a platform for other studies in the drainage, such as collecting samples for genetic stock identification, or tagging Dolly Varden to study their run timing and seasonal distribution (Lisac 2004).

Salmon escapement objectives for the Middle Fork counting tower were established in 1984 as ranges set at 3,000 to 4,000 chinook, 35,000 to 45,000 sockeye, and 13,000 to 18,000 chum salmon (Schultz 1984b). An escapement objective was not established for coho salmon as the project typically ceased operation in mid-August (the coho salmon run in the Middle Fork extends through September and into October). In 1989, the escapement objective range for sockeye salmon was lowered to 20,000 to 30,000 fish. An evaluation of the sockeye salmon exploitation rate in previous years indicated that historical harvest levels could be maintained with a reduced escapement objective (Burkey 1990). These ranges remained in place when the tower was replaced with the fixed-picket weir in 1991.

In 1993, SEGs for chinook, sockeye, and chum salmon were established for the weir (Buklis 1993). The respective SEGs were set as the midpoints of the tower escapement objective ranges: 3,500, 25,000, and 15,000 for chinook, sockeye, and chum salmon, respectively. All salmon escapement goals for the Kuskokwim Area were revised in January 2004 (ADF&G 2004). The new goals, which are described as ranges, will be in effect beginning with the 2004 season. The new SEGs for Middle Fork Goodnews River weir are 2,000 to 4,500 chinook salmon, greater than 12,000 chum salmon, and 23,000 to 58,000 sockeye salmon. A SEG was also established for coho salmon at the weir at greater than 12,000.

Project History

The project was initiated as a counting tower in 1981 and was operated through 1990 (Schultz 1982, 1984a, 1984b, 1985, 1987; Schultz and Burkey 1989; Burkey 1989, 1990) targeting counts of chinook, sockeye, and chum salmon. Although successful, the tower was limited by problems with species apportionment and high labor costs (Menard 1999). In 1991, resources were redirected towards a fixed-picket weir to reduce labor costs and improve species identification. The fixed-

picket weir was operated from 1991 through mid-season in 1997 about 250 yards downstream of the former tower site. Species identification improved with the weir, as the observer was now just a few feet from the fish passing upstream. Labor costs were also reduced with the weir. Fish passage could be controlled, eliminating the need for hourly monitoring, and increasing the efficiency of live fish capture to collect ASL information. Personnel were reduced from three crewmembers to two. Flood events were a problem if the weir could not be removed in time. The weir would rapidly collect debris, damming the flow until it failed and washed downstream. This occurred several times during the early 1990's.

In the mid 1990's the Department began cooperating with the USFWS and the Togiak National Wildlife Refuge to build a resistance-board weir and extend the project's operational period to include the coho salmon run in August and September. In July 1997, the fixed-picket weir was replaced with the resistance-board weir, designed to shed debris loads by sinking beneath a heavy flow. The resistance-board weir has allowed the project to remain operational during higher water levels than the fixed-picket weir, and regain operation quickly after a flood event.

Extended operation has also allowed biologists to monitor the migration of smaller Dolly Varden, believed to be a pre-spawning population over wintering in the drainage (Lisac 2001). Dolly Varden makes a contribution to the overall subsistence harvest of the residents of the Goodnews Bay area (Wolfe et al. 1984). However, information about their life history and abundance is limited. Dolly Varden runs in the Middle Fork Goodnews River have ranged from 1,800 to 6,600 fish (Lisac 2001, Estensen 2003).

Site Description

The Middle Fork parallels the Goodnews River (north fork) and flows a distance of about 45 river miles before joining the main stem. Salmon escapement is monitored through a resistance-board weir located on the Middle Fork approximately 5 river miles from its confluence with the Goodnews River (north fork), and approximately 11 river miles from the District 5 commercial fishery in Goodnews Bay (Figure 1). The field camp is situated on the south side of the river, on a cut bank that was used in previous years to mount a counting tower. The weir is installed about 100 yards downstream of the cut bank, where the channel widens before entering swift riffles another 100 yards below. The channel here is 200 feet wide, has a regular profile from one to four feet deep and flows two to four feet per second during normal water conditions. The river substrate is primarily cobblestone, gravel, and sand.

Objectives

1. Enumerate the daily and total annual escapements of adult chinook, sockeye, chum, pink, and coho salmon and Dolly Varden into the Middle Fork Goodnews River from mid-June through September.

2. Estimate ASL composition for total adult chinook, sockeye, chum, and coho salmon escapements into the Middle Fork Goodnews River from a minimum of three pulse samples distributed throughout their respective runs.

METHODS

Resistance-board Weir Operation

A resistance-board weir is used as a barrier through which adult salmon passage is controlled using a gate, so they may be clearly identified and counted as they continue upstream. A trap is incorporated into the weir, so fish may be captured for collection of ASL samples and returned live to the stream.

The resistance-board weir used in this project is similar to the designs described in Tobin (1994), with panel modifications described in Stewart (2002). The weir consists of two principal components: weir panels form the barrier, and a substrate rail anchors the panels to the river bottom. Other components include passage chutes to allow fish passage through the weir, bulkheads and fixed pickets to prevent fish from passing around either side of the weir, modified boat passage panels to allow boat traffic over the weir, and a trap to collect data from live fish. The rail is anchored to the streambed across the width of the channel. Each panel is a 3' wide array of 1" by 20' long tubular PVC pickets. Each picket is sealed at both ends for flotation. One end of the panel is attached to the rail and the other end floats to the surface downstream. The action of stream flow against an inclined resistance-board mounted beneath the downstream end of the panel lifts this end above the stream surface. When attached side by side along the rail, panels form the face of the weir. During flood conditions, panels are forced below the water's surface, allowing debris to pass unobstructed over the weir. The picket interval of the Middle Fork Goodnews weir is 2-5/8 inches, which leaves a gap of 1-5/16 inches between pickets.

Installation of the resistance-board weir followed the procedures described in Stewart (2003), using dry suits and snorkel gear to improve wading capability and complete underwater tasks. The substrate rail was left in the river bottom the previous winter, and a portion of the bottom was scoured out beneath it as a result of the bottom heaving and thawing. It was necessary to remove 80 feet of the rail, smooth out the bottom, and reinstall it. Some of the rail legs and stakes were bent but were easily straightened. A passage chute was placed near the thalweg about one third of the way across the channel from the river's south bank. The boat passage panels were placed in mid channel. The live trap was placed in front of a fixed weir portion along the south bank in about 3 feet of water. Weir installation was finished on the 18th of June.

The weir was operational from the 18th of June to the 18th of September, during which time fish were not allowed to pass unmonitored. Passage counts were conducted periodically during daylight hours. Substantial delays in fish passage occurred only at night or during ASL sampling. Crewmembers enumerated each fish by species as it passed through the gate. A 4-foot square aluminum panel was placed on the river bottom in front of the gate as a backdrop to better identify fish as they passed over it. Fish counts were tallied and recorded at the end of each day. Daily and

cumulative salmon counts were reported each morning to the Department office in Bethel via single side band radio or satellite telephone.

A high water event in mid August created very turbid water that made passage counts difficult for a few days. A 30-inch square aluminum panel was placed to block the lower portion of the 4-foot tall gate to force the fish closer to the surface for identification. On the 14th and 15th of August fish were counted but not speciated because the water was too turbid to identify species reliably.

Dolly Varden and whitefish were counted too. Smaller fish in these populations pass freely between the weir pickets and it is unclear at what size or how many of these fish pass undetected. The feasibility of Dolly Varden counts at the weir to estimate spawning population abundance is being studied by the Togiak National Wildlife Refuge. The weir crew assisted USFWS personnel in collecting samples from Dolly Varden captured both with the live trap, as they pass through the weir, and with a seine net farther upstream.

Weir Maintenance and cleaning of debris and fish carcasses was conducted several times a day. Carcasses were counted by species and recorded daily.

Escapement Estimates

Fish passage before or after the date the weir was operational was not estimated. Fish could be counted passing upstream through the weir for all days during the operational period and tallied by species on nearly all days. Only total fish counts were made for August 14th and 15th due to poor visibility. Counts were apportioned to species by the project leader in Bethel after the season. The proportion of total daily count of each species was estimated by taking the ratio of the passage of each species on the 13th and 16th to the passage of all species passed on those dates. These species proportions were then multiplied by the daily total fish count for estimates of number of fish by species on the 14th and 15th.

Age-Sex-Length Composition Estimates

Age-sex-length (ASL) composition of the total annual chinook, sockeye, chum, and coho salmon escapement past the weir was estimated by sampling a fraction of the fish passage and applying the ASL composition of those samples to the total escapement (DuBois and Molyneaux 2000).

A pulse sampling design was used, in which intensive sampling was conducted for 1 to 3 days followed by a few days without sampling. Pulse sampling was conducted on a weekly basis to collect a minimum of 3 pulses distributed between each third of the run for chinook, sockeye, chum, and coho salmon. The objective sample size for each pulse sample was 210 samples from chinook and sockeye salmon, 200 samples from chum salmon, and 70 samples from coho salmon.

These sample sizes were selected so that the simultaneous 95% confidence interval estimates of age and sex composition proportions would be no wider than 0.20 (Bromaghin 1993) per pulse for chinook and sockeye salmon with 10 age/sex categories and chum salmon with 8 age/sex categories, and for the entire season for coho salmon with 10 age/sex categories. Samples sizes were

increased by 10% from that recommended by Bromaghin (1993) to account for scales that cannot be aged.

Fish were captured using a dip net and live trap installed in the weir. Lengths (mid eye to fork of tail) were measured to the nearest 5 mm using a steel rule mounted in a plywood cradle. Sex was determined by examination of external characteristics including body shape, development of the kype, and presence of an ovipositor. Three scales each were collected from chinook and coho salmon, and one scale each from sockeye and chum salmon, and arranged on gum cards. Fish were released live next to the bank upstream of the weir, where the current was slow. To avoid any bias, all fish of the target species remaining in the trap, were sampled after the sample size had been reached. Sex and length data were transferred to mark-sense forms and sent with the gum cards to the Department Bethel office for processing.

Estimation of ASL composition was conducted post season by Department staff in Bethel and Anchorage. Impressions from the gum cards were made on cellulose acetate cards with a heated hydraulic press (Clutter and Whitesel 1956). Ages of the salmon were determined by examining the scale impressions (Mosher 1968). Ages were recorded in European notation (Koo 1962). ASL data was processed to generate data summaries. The ASL data generated two types of summary tables for each species (Folletti 2004). One table describes the age and sex composition and the other describes length statistics. These summaries account for changes in the ASL composition throughout the season by first partitioning the season into temporal strata based on pulse sample dates, applying ASL composition of individual pulse samples to the corresponding temporal strata, and finally summing the strata to generate the estimated ASL composition for the season.

Atmospheric and Hydrological Monitoring

Atmospheric and hydrological conditions were recorded daily at or around noon. Cloud cover was judged from clear to overcast; wind speed was recorded in mph and direction noted; precipitation measured in mm per 24h; daily high and low air temperature and water temperature recorded in degrees Celsius. The river gauge height was recorded daily and was pegged to a benchmark established in 1997. The benchmark is a ¾ inch diameter steel length of rebar driven into the bank along a steep grade where the skiffs tie-up below the field camp, and is marked with red tape. The river gauge is a steel rule installed in the river along the bank, and is pegged level with the top of the benchmark at 150 cm.

RESULTS

Weir Operations

The weir was operational from the 18th of June to the 18th of September. Counts of salmon were made each day during that period. Only salmon enumeration by species was interrupted during a high water event on the 14th and 15th of August when the water was too turbid to identify species reliably.

Escapement Estimates

A total of 2,368 chinook, 44,348 sockeye, 21,585 chum, 52,066 coho, 1,905 pink salmon, 1,943 Dolly Varden, and 268 whitefish were observed migrating through the weir. Of this total, 865 fish were counted on the 14th and 15th of August, not identified by species at the time, but apportioned to species postseason (Tables 1 and 2).

Salmon were observed the first day of weir operation and still counted in some numbers at the close of the project in September. Chinook salmon were observed passing upstream of the weir from 18 June to 12 September. Peak daily passage of 198 chinook salmon occurred on 20 July, with a median passage date of 14 July. The central 50% of the observed passage occurred between 7 and 20 July. Sockeye and chum salmon were also observed from 18 June through 18 September. The peak daily passage of sockeye salmon was 6 July, with a median passage date of 4 July. The central 50% of the observed passage occurred between 26 June and 10 July. The peak daily passage and median passage date of chum salmon was 20 July, with the central 50% of the observed passage occurred between 14 and 29 July. The peak daily passage of coho salmon was 25 August, with a median passage date of 30 August. The central 50% of the observed passage occurred between 25 August and 8 September.

Whitefish and Dolly Varden were also counted through the weir in 2003. Whitefish were observed in very small numbers during project duration. Dolly Varden were observed from 20 June through 10 September at the weir (Table 2). Peak daily passage of 134 Dolly Varden was observed 19 July, with a median passage date of 24 July. The central 50% of the observed passage of Dolly Varden occurred between 18 July and 31 July.

Fish carcasses were cleaned off of the weir from June 20 through September 17 (Table 3). When stream discharge and debris load were high, carcasses were often swept away uncounted as the weir panels sank under the weight of crewmembers cleaning the weir. Therefore counts noted in Table 3 should be considered a minimum.

Age-Sex-Length Composition Estimates

A total of 285 ASL samples were collected from chinook salmon, of which 241 were used to characterize three time strata. A total of 855 samples were collected from sockeye salmon, of which 657 were used to characterize four time strata. A total of 640 samples were collected from chum salmon, of which 566 were used to characterize four time strata. A total of 210 samples were collected from coho salmon, of which 167 were used to characterize three time strata.

Chinook salmon were predominantly age 1.3 and 1.4 with 41.6% being female among all age classes (Table 4). Female chinook salmon were larger at age than the males (Table 5). Mean length was 731 mm and 788 mm for age 1.3 male and female chinook salmon and 807 mm and 848 mm for age 1.4 males and females. Sockeye salmon were predominantly (86.6%) age 1.3 with a sex ratio of 45.6% female among all age classes (Table 6). Sockeye males were larger than females at age (Table 7).

Age 1.3 sockeye salmon males averaged 597 mm and females 560 mm. Chum salmon were predominantly age 0.3 (84.5%) with a sex ratio of 45.6% female among all age classes (Table 8). Chum salmon males were larger at age than females averaging 582 mm at age 0.3 (Table 9). Coho salmon were predominantly age 2.1 (87.1%) with a sex ratio of 44% female among all age classes (Table 10). Males and females were very similar size at age for 2.1; 611 mm and 608 mm respectively (Table 11).

Atmospheric and Hydrological Monitoring

Atmospheric and Hydrological observations were recorded daily from June 14 through September 22 (Table 12). Air temperatures ranged from -8 to 27 degrees Celsius. Water temperature was more consistent starting at 10.5 degrees Celsius in June warming to 15 degrees by August 8 and cooling to 5 degrees Celsius by September 22. Several rain events resulted in accumulations of up to 38.8 mm in a 24 h period.

DISCUSSION

The project achieved its objectives of enumerating the escapement of chinook, sockeye, chum, pink, and coho salmon into the Middle Fork Goodnews River, and characterizing the ASL composition over their respective runs. The project continues to add information to the long-term escapement, run timing, and ASL database for salmon at the weir, and serves as a platform for the study of other anadromous and resident freshwater species.

Obtaining adequate sample sizes for chinook salmon ASL determination continues to be problematic. Low abundance, migration patterns, and behavior around the weir have made sample collection difficult over the years. Chinook salmon have achieved their escapement goal in only four years since 1993. Chinook salmon tend to migrate through the weir in large pulses so that passage will be slow for a period of days then suddenly peak. This movement is difficult to anticipate for the coordination of ASL sampling. The abundance of sockeye and chum salmon during the chinook salmon migration also tends to crowd them out of the live trap. A more active strategy of capturing chinook individually, or in small groups as other species are allowed to pass freely through the trap, has improved collection efforts. This strategy works well but is time intensive and chinook salmon are often hesitant to approach the weir with the increased activity around the trap.

Escapement Characteristics

Sufficient historical data exists for run timing comparisons for chinook, sockeye, and chum salmon. The chinook salmon migration in 2003 was three to four days behind the historical average (Figure 2). Sockeye salmon were about three days ahead of their historical average (Figure 3) while chum salmon were three to four days behind their historical average (Figure 4). The historic run timing for coho salmon has not yet been determined as the end of the run has not yet been depicted by enough

years of data. The cumulative passage of coho salmon has been observed over time for the past seven years (Figure 5).

For 2003 SEGs were established only for chinook, sockeye, and chum salmon at the Middle Fork Goodnews River weir. The weir count was below the SEG of 3,500 chinook salmon, but well above the SEG of 25,000 for sockeye salmon and 15,000 for chum salmon (Appendix A.). An SEG of greater than 12,000 coho salmon has been set for Middle Fork Goodnews River for use in 2004. All other SEGs have been converted to ranges (ADF&G 2004) and will become the basis for comparison next year.

In 2003 the weir count for coho salmon, was the largest since counting extended for coho salmon in 1997. This is remarkable considering the poor escapement observed in the 1999 parent year (Figure 5). The weir count for chinook salmon was the lowest since 1993. The 2003 sockeye salmon weir count was double that seen in 2001 and 2002; more similar to what was counted in 1998-2001. Chum salmon weir count was higher than the low years of 1997, 1999, and 2000.

Run Abundance

Salmon spawn primarily in the North Fork and Middle Fork rivers of the Goodnews River drainage and their associated lakes. Chinook, sockeye, chum, and coho salmon escapements are estimated for the North Fork Goodnews River using aerial survey counts over both the North Fork and Middle Fork drainages during peak spawning as they relate to the Middle Fork weir count. A ratio of the Middle Fork weir count to the Middle Fork aerial survey count for each species is used to expand the North Fork aerial survey counts. The resulting North Fork estimate is later adjusted to account for the proportion of each species that pass the weir after the aerial survey date (Appendix A.). It is believed that less than 10% of the salmon returning to the Goodnews River spawn in the South Fork, and no estimate is made for this portion of the drainage.

Harvest estimates (Appendix B) are combined with escapement estimates to estimate total run abundance and exploitation for the Goodnews River drainage (Appendix C.). When compared with runs over the last 10 years the 2003 run was 27% below average for chinook, 13% below average for sockeye, and 40% below average for chum salmon. Exploitation is estimated to be near 10-year average of 24% for chinook, 23% for sockeye, and 10% for chum salmon. Run abundance has been estimated when complete data sets exist since 1981 (Appendix D). Abundance and market conditions affect the level of commercial harvest.

Coho total run abundance was not estimated in 2003. Aerial surveys are often unsuccessful for coho salmon due to weather or unavailability of aircraft. Aerial surveys for coho salmon were not conducted in 2003. Commercial catch data from District 5 and a strong weir escapement suggest an above average or strong run.

Age-Sex-Length Composition Estimates

Age composition of salmon sampled at the Middle Fork Goodnews River weir can be compared to with data collected since 1991 for chinook and coho salmon, 1987 for sockeye salmon, and 1990 for chum salmon (Folletti 2004). Historically age 1.4 chinook salmon have been most abundant (Table 4), while in 2003 age 1.3 dominated. Age 1.3 sockeye salmon dominated (Table 5) both historical (73.8%) and 2003 samples (86.6). In contrast the chum salmon weir count consisted of younger age 0.3 (84.5) than the historical average (65%). Coho salmon runs continue to be dominated by a single age class, 2.1, representing 90.3 % historically. Sibling relationships have not been developed which could be used to predict whether the presence of younger aged chinook and chum salmon indicate a strong return of age 1.4 or 0.4 next year.

CONCLUSIONS

Weir Operations

- This project has demonstrated the ability to successfully install and operate a resistance board weir on the Middle Fork Goodnews River. High water levels and obscured visibility resulted in 2-days of counts in which species could not be determined. Otherwise the weir was operational for the intended counting period.
- Total annual escapement was estimated for chinook, sockeye, chum and coho salmon and Dolly Varden.

Fish Passage and Run Abundance

- Salmon escapement at the weir exceeded all SEGs except for chinook salmon in 2003.
- A SEG threshold has been set for coho salmon for use in 2004 as well as new SEG ranges for chinook and sockeye salmon, and a SEG threshold for chum salmon.
- Chinook and chum salmon weir counts and total run including sockeye salmon was below the 10-year average. Sockeye salmon escapement and total run was improved from 2002.
- Coho salmon escapement in 2003 was the largest escapement yet recorded for the Middle Fork Goodnews River, which was consistent with trends seen elsewhere in the Kuskokwim area.
- Unsuccessful in completing an aerial survey for coho salmon. Total escapement and run abundance could not be estimated in 2003 for Goodnews River drainage coho salmon.

Age-Sex-Length Composition

- There were no noteworthy deviations from past years in the ASL composition for sockeye or coho salmon. An increase in a younger age class of chinook and chum salmon from the historic average was observed and are good indications of continued improvement in run abundance in 2004.

RECOMMENDATIONS

Annual operation of the Middle Fork Goodnews River weir should continue indefinitely. As the only ground based monitoring project in District 5 (Goodnews Bay District), the project provides valuable inseason and postseason information about chinook, sockeye, chum, and coho salmon that are critical for sustainable salmon management practices.

Weir Operations and ASL Sampling

- After the season the substrate rail should be left in the deeper portion of the channel, to speed spring installation and startup, and removed from the shallower portion to avoid scouring overwinter. The shallow portion currently extends 80 ft. from the north bank. This portion of the river goes dry in the winter and is subject to frost heaving, which displaces the rail and causes scouring during the spring flood.
- Active sampling for chinook salmon should continue in order meet ASL sample size goals.

Fish Passage and Total Escapement Estimation

- Recommend additional efforts to obtain an aerial survey for coho salmon on the Middle Fork and North Fork Rivers of the Goodnews Drainage to estimate total escapement.
- Recommend in 2004 use existing data to estimate historical run timing for coho salmon at the weir.
- Implement a target operational period and develop methods for estimating passage missed during this period as described in Linderman et al. (2004).

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Table 1. Daily and cumulative salmon passage, Middle Fork Goodnews River weir, 2003.

Date	Chinook		Sockeye		Chum		Coho		Pink	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
18-Jun	4	4	60	60	0	0	0	0	0	0
19-Jun	8	12	497	557	1	1	0	0	1	1
20-Jun	2	14	657	1214	1	2	0	0	0	1
21-Jun	30	44	1,164	2378	7	9	0	0	0	1
22-Jun	24	68	1,236	3614	11	20	0	0	0	1
23-Jun	43	111	826	4440	22	42	0	0	0	1
24-Jun	18	129	2,161	6601	13	55	0	0	0	1
25-Jun	22	151	2,311	8912	27	82	0	0	0	1
26-Jun	16	167	2,190	11102	17	99	0	0	4	5
27-Jun	14	181	1,357	12459	29	128	0	0	2	7
28-Jun	10	191	1,445	13904	17	145	0	0	1	8
29-Jun	7	198	1727	15631	28	173	0	0	7	15
30-Jun	70	268	1,433	17064	71	244	0	0	2	17
1-Jul	82	350	1,226	18290	213	457	0	0	9	26
2-Jul	29	379	1114	19404	36	493	0	0	6	32
3-Jul	15	394	1,003	20407	41	534	0	0	4	36
4-Jul	33	427	1,202	21609	73	607	0	0	2	38
5-Jul	6	433	1,079	22688	121	728	0	0	6	44
6-Jul	91	524	2,862	25550	237	965	0	0	27	71
7-Jul	50	574	1,645	27195	159	1124	0	0	31	102
8-Jul	83	657	2,107	29302	709	1833	0	0	88	190
9-Jul	185	842	2,232	31534	399	2232	0	0	92	282
10-Jul	23	865	992	32526	210	2442	0	0	20	302
11-Jul	37	902	1,670	34196	189	2631	1	1	23	325
12-Jul	28	930	844	35040	611	3242	0	1	18	343
13-Jul	131	1,061	1,368	36408	1,484	4726	0	1	58	401
14-Jul	117	1,178	1,159	37567	1,192	5918	0	1	88	489
15-Jul	198	1,376	475	38042	729	6647	0	1	80	569
16-Jul	51	1,427	578	38620	417	7064	0	1	26	595
17-Jul	32	1,459	431	39051	641	7705	0	1	27	622
18-Jul	77	1,536	702	39753	634	8339	0	1	45	667
19-Jul	60	1,596	654	40407	1,096	9435	0	1	40	707
20-Jul	199	1,795	595	41002	1,591	11026	2	3	75	782
21-Jul	81	1,876	308	41310	622	11648	2	5	73	855
22-Jul	55	1,931	324	41634	797	12445	1	6	93	948
23-Jul	25	1,956	225	41859	474	12919	1	7	16	964
24-Jul	50	2,006	323	42182	426	13345	0	7	39	1003
25-Jul	85	2,091	329	42511	633	13978	1	8	55	1058
26-Jul	14	2,105	140	42651	663	14641	0	8	24	1082
27-Jul	4	2,109	124	42775	507	15148	0	8	29	1111
28-Jul	53	2,162	126	42901	561	15709	4	12	41	1152
29-Jul	28	2,190	193	43094	384	16093	5	17	33	1185
30-Jul	6	2,196	58	43152	409	16502	1	18	15	1200
31-Jul	23	2,219	126	43278	367	16869	4	22	26	1226
1-Aug	6	2,225	80	43358	463	17332	0	22	19	1245
2-Aug	16	2,241	116	43474	506	17838	7	29	20	1265

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Table 1. (Page 2 of 2)

Date	Chinook		Sockeye		Chum		Coho		Pink	
	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.	Daily	Cum.
3-Aug	9	2,250	95	43,569	600	18,438	11	40	50	1,315
4-Aug	4	2,254	73	43,642	744	19,182	15	55	47	1,362
5-Aug	8	2,262	29	43,671	481	19,663	19	74	49	1,411
6-Aug	26	2,288	56	43,727	362	20,025	144	218	32	1,443
7-Aug	0	2,288	19	43,746	410	20,435	44	262	30	1,473
8-Aug	23	2,311	47	43,793	372	20,807	223	485	32	1,505
9-Aug	3	2,314	21	43,814	202	21,009	89	574	9	1,514
10-Aug	3	2,317	24	43,838	176	21,185	96	670	20	1,534
11-Aug	0	2,317	25	43,863	114	21,299	65	735	9	1,543
12-Aug	1	2,318	6	43,869	16	21,315	24	759	3	1,546
13-Aug	13	2,331	18	43,887	28	21,343	271	1,030	12	1,558
14-Aug a	6	2,337	11	43,898	15	21,358	215	1,245	8	1,566
15-Aug a	15	2,352	28	43,926	37	21,395	529	1,774	8	1,574
16-Aug	7	2,359	21	43,947	19	21,414	493	2,267	5	1,579
17-Aug	4	2,363	18	43,965	13	21,427	344	2,611	11	1,590
18-Aug	1	2,364	7	43,972	13	21,440	198	2,809	3	1,593
19-Aug	2	2,366	17	43,989	6	21,446	303	3,112	0	1,593
20-Aug	7	2,373	27	44,016	23	21,469	816	3,928	9	1,602
21-Aug	4	2,377	27	44,043	12	21,481	512	4,440	14	1,616
22-Aug	1	2,378	13	44,056	21	21,502	1,036	5,476	14	1,630
23-Aug	1	2,379	29	44,085	20	21,522	781	6,257	22	1,652
24-Aug	1	2,380	7	44,092	11	21,533	795	7,052	5	1,657
25-Aug	1	2,381	18	44,110	16	21,549	5,886	12,938	20	1,677
26-Aug	0	2,381	17	44,127	14	21,563	1,979	14,917	22	1,699
27-Aug	0	2,381	23	44,150	4	21,567	672	15,589	8	1,707
28-Aug	0	2,381	11	44,161	15	21,582	3,088	18,677	13	1,720
29-Aug	0	2,381	9	44,170	6	21,588	2,420	21,097	13	1,733
30-Aug	1	2,382	24	44,194	5	21,593	4,010	25,107	25	1,758
31-Aug	0	2,382	20	44,214	16	21,609	3,247	28,354	28	1,786
1-Sep	0	2,382	24	44,238	3	21,612	2,260	30,614	29	1,815
2-Sep	0	2,382	13	44,251	1	21,613	1,416	32,030	16	1,831
3-Sep	0	2,382	10	44,261	1	21,614	1,191	33,221	9	1,840
4-Sep	1	2,383	16	44,277	3	21,617	2,272	35,493	23	1,863
5-Sep	0	2,383	4	44,281	1	21,618	1,203	36,696	3	1,866
6-Sep	1	2,384	9	44,290	2	21,620	1,005	37,701	0	1,866
7-Sep	1	2,385	4	44,294	1	21,621	1,063	38,764	2	1,868
8-Sep	0	2,385	7	44,301	1	21,622	974	39,738	6	1,874
9-Sep	1	2,386	5	44,306	0	21,622	347	40,085	5	1,879
10-Sep	0	2,386	11	44,317	2	21,624	1,925	42,010	3	1,882
11-Sep	2	2,388	13	44,330	3	21,627	3,264	45,274	7	1,889
12-Sep	1	2,389	15	44,345	2	21,629	1,768	47,042	9	1,898
13-Sep	0	2,389	13	44,358	2	21,631	2,435	49,477	9	1,907
14-Sep	0	2,389	5	44,363	2	21,633	604	50,081	5	1,912
15-Sep	0	2,389	6	44,369	1	21,634	417	50,498	1	1,913
16-Sep	0	2,389	4	44,373	1	21,635	989	51,487	1	1,914
17-Sep	0	2,389	5	44,378	0	21,635	518	52,005	6	1,920
18-Sep	0	2,389	9	44,387	2	21,637	805	52,810	1	1,921

^a Daily counts for all species were estimated.

Table 2. Daily and cumulative passage of non-salmon species, Middle Fork Goodnews River weir, 2003.

Date	Dolly Varden		Whitefish	
	Daily	Cum.	Daily	Cum.
18-Jun	0	0	3	3
19-Jun	0	0	0	3
20-Jun	2	2	2	5
21-Jun	2	4	5	10
22-Jun	1	5	9	19
23-Jun	4	9	4	23
24-Jun	4	13	6	29
25-Jun	1	14	4	33
26-Jun	0	14	0	33
27-Jun	4	18	7	40
28-Jun	1	19	0	40
29-Jun	1	20	1	41
30-Jun	2	22	5	46
1-Jul	0	22	2	48
2-Jul	1	23	0	48
3-Jul	4	27	1	49
4-Jul	3	30	0	49
5-Jul	4	34	1	50
6-Jul	19	53	1	51
7-Jul	8	61	5	56
8-Jul	13	74	12	68
9-Jul	20	94	10	78
10-Jul	3	97	1	79
11-Jul	29	126	0	79
12-Jul	20	146	0	79
13-Jul	29	175	8	87
14-Jul	51	226	19	106
15-Jul	33	259	11	117
16-Jul	49	308	12	129
17-Jul	55	363	4	133
18-Jul	83	446	2	135
19-Jul	134	580	4	139
20-Jul	121	701	9	148
21-Jul	95	796	10	158
22-Jul	54	850	11	169
23-Jul	51	901	4	173
24-Jul	98	999	1	174
25-Jul	109	1108	5	179
26-Jul	80	1188	1	180
27-Jul	68	1256	2	182
28-Jul	45	1301	3	185
29-Jul	68	1369	4	189
30-Jul	62	1431	1	190
31-Jul	71	1502	5	195
1-Aug	114	1616	0	195
2-Aug	57	1,673	0	195
3-Aug	36	1,709	4	199

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Table 2. (Page 2 of 2)

Date	Dolly Varden		Whitefish	
	Daily	Cum.	Daily	Cum.
4-Aug	46	1,755	2	201
5-Aug	31	1,786	4	205
6-Aug	21	1,807	4	209
7-Aug	7	1,814	7	216
8-Aug	11	1,825	6	222
9-Aug	15	1,840	13	235
10-Aug	2	1,842	2	237
11-Aug	5	1,847	7	244
12-Aug	0	1,847	0	244
13-Aug	2	1,849	0	244
14-Aug a	3	1,852	0	244
15-Aug a	3	1,855	0	244
16-Aug	4	1,859	0	244
17-Aug	19	1,878	0	244
18-Aug	7	1,885	0	244
19-Aug	0	1,885	0	244
20-Aug	3	1,888	0	244
21-Aug	2	1,890	1	245
22-Aug	21	1,911	0	245
23-Aug	1	1,912	3	248
24-Aug	2	1,914	0	248
25-Aug	4	1,918	1	249
26-Aug	2	1,920	2	251
27-Aug	1	1,921	3	254
28-Aug	7	1,928	2	256
29-Aug	1	1,929	1	257
30-Aug	1	1,930	1	258
31-Aug	3	1,933	0	258
1-Sep	1	1,934	2	260
2-Sep	1	1,935	0	260
3-Sep	2	1,937	1	261
4-Sep	0	1,937	0	261
5-Sep	2	1,939	1	262
6-Sep	1	1,940	0	262
7-Sep	2	1,942	3	265
8-Sep	0	1,942	1	266
9-Sep	0	1,942	0	266
10-Sep	7	1,949	0	266
11-Sep	0	1,949	0	266
12-Sep	0	1,949	0	266
13-Sep	0	1,949	0	266
14-Sep	0	1,949	0	266
15-Sep	0	1,949	0	266
16-Sep	0	1,949	0	266
17-Sep	0	1,949	0	266
18-Sep	0	1,949	2	268

^a Partial counts due to breach in weir.

Table 3. Daily fish carcass count, Middle Fork Goodnews River weir, 2003.

Date	Chinook	Sockeye	Chum	Pink	Coho	Other ^a
19-Jun						
20-Jun		1				
21-Jun		4				1 RB
22-Jun			1			1 GR
23-Jun		1				
24-Jun		3	1			
25-Jun						
26-Jun		2				
27-Jun		1				
28-Jun		1				
29-Jun		1	1			
30-Jun		1				
1-Jul		2	2			
2-Jul						
3-Jul						
4-Jul						
5-Jul						
6-Jul		1				
7-Jul		1	2			
8-Jul		3	3			
9-Jul		2	2			
10-Jul		5	6			
11-Jul		9	4			
12-Jul		7	1			1 DV
13-Jul		4	2			
14-Jul		2	4			2 DV
15-Jul		1	2			1 DV
16-Jul		1	5			1 RB
17-Jul			5			
18-Jul		3	6			
19-Jul		4	8			
20-Jul		3	13			4 DV
21-Jul	2	2	24			3 DV
22-Jul			26			2 DV
23-Jul	1	2	25			1 DV
24-Jul		5	71			2 DV
25-Jul	1	2	65			
26-Jul		5	95	1		
27-Jul	1	5	89			1 DV, 1 WF
28-Jul	2	4	118	2		2 DV
29-Jul	1	4	134	4		
30-Jul	2	1	159			1 DV
31-Jul	1	3	165	4		
1-Aug	2	5	148	8		
2-Aug	8	5	230	15		
3-Aug	13	6	250	17		3 DV

^a AC - arctic char, DV - dolly varden, GR - grayling, RB - rainbow trout, WF - whitefish
-continued-

Table 3. (Page 2 of 2)

Date	Chinook	Sockeye	Chum	Pink	Coho	Other ^a
4-Aug	11	6	250	18		
5-Aug	15	7	282	28		
6-Aug	23	7	303	45		2 DV
7-Aug	20	12	298	43		1 DV
8-Aug	21	11	279	51		
9-Aug	10	10	263	26		2 DV, 1 WF
10-Aug	13	12	274	37		
11-Aug	16	17	149	25		
12-Aug	b	b	b	b	b	b
13-Aug	b	b	b	b	b	b
14-Aug	b	b	b	b	b	b
15-Aug	b	b	b	b	b	b
16-Aug	5	12	25	4		
17-Aug	4	7	49	2		
18-Aug	3	5	30	1		
19-Aug	3	11	33	3		
20-Aug	2	8	29	7		
21-Aug	4					
22-Aug	2	19	32	5	1	1 RB
23-Aug	8	17	26	9	1	
24-Aug	2	5	9	2	1	
25-Aug	5	17	16	3	1	
26-Aug	3	14	7	2	2	
27-Aug	4	18	14	3	1	
28-Aug	2	17	8	6	1	
29-Aug		14	9	3	1	1 DV
30-Aug		27	12	5		
31-Aug		12	3	3	3	
1-Sep		7	2	4	2	
2-Sep		6	2	3	3	
3-Sep		4	3	2	2	1 AC
4-Sep		5		7	1	
5-Sep		7		7	4	
6-Sep		6	1	4	1	
7-Sep		7	2	6	3	
8-Sep		2	1	2		
9-Sep		1	1	3	1	
10-Sep		9	2	17	6	
11-Sep		1	1	7	3	
12-Sep		1		3	3	
13-Sep		3	1	7	2	
14-Sep		3	3	8	4	1 WF
15-Sep		4	1	7	5	
16-Sep		1		17	3	
17-Sep		2	1	9	4	

^a AC - arctic char, DV - dolly varden, GR - grayling, RB - rainbow trout, WF - whitefish^b Heavy debris load on weir prevented mort enumeration and speciation

Table 4. Age and sex composition of chinook salmon escapement at the Middle Fork Goodnews River weir, 2003.

Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class										Total	
			1.1		1.2		1.3		1.4		1.5			
			Esc.	%	Esc.	%	Esc.	%	Esc.	%	Esc.	%	Esc.	%
6/22 - 6/9 (6/18 - 7/9)	73	M	12	1.4	92	11.0	311	37.0	69	8.2	12	1.3	496	58.9
		F	0	0.0	0	0.0	162	19.2	139	16.5	46	5.5	346	41.1
		Subtotal	12	1.4	92	11.0	473	56.2	208	24.7	58	6.8	842	100.0
7/13 - 7/16 (7/10 - 7/19)	98	M	54	7.1	85	11.2	277	36.7	46	6.1	8	1.0	469	62.2
		F	0	0.0	0	0.0	100	13.3	162	21.5	23	3.1	285	37.8
		Subtotal	54	7.1	85	11.2	377	50.0	208	27.6	31	4.1	754	100.0
7/20 - 7/28 (7/20 - 9/17)	70	M	11	1.4	147	18.6	135	17.1	124	15.7	12	1.5	429	54.3
		F	0	0.0	0	0.0	68	8.6	282	35.7	11	1.4	361	45.7
		Subtotal	11	1.4	147	18.6	203	25.7	406	51.4	23	2.9	790	100.0
Season	241	M	77	3.2	324	13.6	724	30.3	240	10.0	31	1.3	1394	58.4
		F	0	0.0	0	0.0	329	13.8	582	24.4	80	3.4	992	41.6
		Total	77	3.2	324	13.6	1053	44.1	822	34.4	111	4.7	2386	100.0
Historical (1991, 1995, 1997, 2002, 2003)	1,362	M	123	0.7	4470	25.2	3897	22.0	2624	14.8	74	0.4	11196	63.2
		F	0	0.0	61	0.3	1233	7.0	4776	27.0	446	2.5	6516	36.8
		Total	123	0.0	4531	25.6	5130	29.0	7400	41.8	521	2.9	17712	100.0

Table 5. Mean length (mm) of chinook salmon escapement through the Middle Fork Goodnews River weir, 2003.

Sample Dates (Stratum Dates)	Sex		Age Class					
			1.1	1.2	1.3	1.4	1.5	2.4
6/2 - 6/29 (6/18 - 7/9)	M	Mean Length	375	533	705	692	990	
		Std. Error	-	23	9	60	-	
		Range	375- 375	390- 595	619- 775	506- 880	990- 990	
		Sample Size	1	8	27	6	1	0
	F	Mean Length			787	830	828	
		Std. Error			6	12	48	
		Range			740- 830	740- 890	705- 935	
		Sample Size	0	0	14	12	4	0
	M	Mean Length	374	565	751	831	870	
		Std. Error	35	13	10	21	-	
		Range	240- 550	515- 655	580- 870	760- 895	870- 870	
		Sample Size	7	11	36	6	1	0
7/13 - 7/16 (7/10 - 7/19)	F	Mean Length			797	840	857	
		Std. Error			13	9	20	
		Range			740- 875	790- 940	825- 895	
		Sample Size	0	0	13	21	3	0
	M	Mean Length	385	529	752	862	915	
		Std. Error	-	22	16	22	-	
		Range	385- 385	425- 700	660- 840	735- 975	915- 915	
		Sample Size	1	13	12	11	1	0
	F	Mean Length			779	860	820	
		Std. Error			24	9	-	
		Range			670- 830	790- 940	820- 820	
		Sample Size	0	0	6	25	1	0
Season	M	Mean Length	375	540	731	807	932	
		Range	240- 550	390- 700	580- 870	506- 975	870- 990	
		Sample Size	9	32	75	23	3	0
	F	Mean Length			788	848	835	
		Range			670- 875	740- 940	705- 935	
		Sample Size	0	0	33	58	8	0
Historical	M	Mean Length	386	544	716	847	886	945
		Range	240- 550	445- 850	550- 910	680- 1035	990- 990	945-945
		Sample Size	12	238	263	169	6	1
	F	Mean Length		610	798	857	898	
		Range		540- 670	560- 880	470- 1005	990- 990	
		Sample Size	0	3	92	318	18	0

Table 6. Age and sex composition of sockeye salmon escapement at the Middle Fork Goodnews River weir, 2003.

Sample Dates (Stratum Dates)	Samp. Size	Sex	Age Class												Total	
			0.3		1.2		1.3		2.2		1.4		2.3			
			Esc.	%	Esc.	%	Esc.	%	Esc.	%	Esc.	%	Esc.	%	Esc.	%
6/22 - 6/29 (6/18 - 6/29)	180	M	87	0.6	348	2.2	6,860	43.9	0	0.0	347	2.2	174	1.1	7,816	50.0
		F	0	0.0	347	2.2	7,295	46.7	0	0.0	87	0.6	87	0.6	7,815	50.0
		Subtotal	87	0.6	695	4.4	14,155	90.6	0	0.0	434	2.8	261	1.7	15,631	100.0
7/4 (6/30 - 7/8)	146	M	94	0.7	843	6.1	7,210	52.7	0	0.0	0	0.0	94	0.7	8,240	60.3
		F	0	0.0	749	5.5	4,401	32.2	0	0.0	94	0.7	187	1.4	5,431	39.7
		Subtotal	94	0.7	1,592	11.6	11,611	84.9	0	0.0	94	0.7	281	2.1	13,671	100.0
7/11 (7/9 - 14)	160	M	0	0.0	0	0.0	3,823	46.3	0	0.0	103	1.3	207	2.5	4,133	50.0
		F	52	0.6	568	6.9	3,306	40.0	52	0.6	52	0.6	103	1.3	4,132	50.0
		Subtotal	52	0.6	568	6.9	7,129	86.3	52	0.6	155	1.9	310	3.8	8,265	100.0
7/17 (7/15 - 9/18)	171	M	0	0.0	239	3.5	3,470	50.9	80	1.2	40	0.6	120	1.7	3,948	57.9
		F	0	0.0	678	10.0	2,074	30.4	40	0.6	40	0.6	40	0.6	2,872	42.1
		Subtotal	0	0.0	917	13.5	5,544	81.3	120	1.8	80	1.2	160	2.3	6,820	100.0
Season	657	M	180	0.4	1,429	3.2	21,363	48.1	80	0.2	491	1.1	594	1.3	24,136	54.4
		F	52	0.1	2,343	5.3	17,075	38.5	91	0.2	272	0.6	417	1.0	20,251	45.6
		Total	232	0.5	3,772	8.5	38,438	86.6	171	0.4	763	1.7	1,011	2.3	44,387	100.0
Historical (1987,1995, 1997, 2000-03)	4,852	M	5,854	1.9	15,912	5.2	114,600	37.8	2,379	0.8	4,909	1.6	7,476	2.5	151,862	50.1
		F	2,418	0.8	25,415	8.4	109,202	36.0	3,676	1.2	2,926	1.0	7,000	2.3	151,321	49.9
		Total	8,272	2.7	41,327	13.6	223,802	73.8	6,055	2.0	7,835	2.6	14,476	4.8	303,180	100.0

Table 7. Mean length (mm) of sockeye salmon escapement through the Middle Fork Goodnews River weir, 2003.

Sample Dates (Stratum Dates)	Sex		Age Class					
			0.3	1.2	1.3	2.2	1.4	2.3
6/22 - 6/29 (6/18 - 6/29)	M	Mean Length	650	531	594		623	605
		Std. Error	-	11	3		6	10
		Range	650- 650	502- 556	535- 665		610- 637	595- 615
		Sample Size	1	4	79	0	4	2
	F	Mean Length		512	562		592	542
		Std. Error		2	3		-	
		Range		505- 515	515- 645		592- 592	542- 542
		Sample Size	0	4	84	0	1	1
7/4 (6/30 - 7/8)	M	Mean Length	635	556	605			585
		Std. Error	-	12	3			-
		Range	635- 635	520- 625	535- 655			585- 585
		Sample Size	1	9	77	0	0	1
	F	Mean Length		507	562		570	573
		Std. Error		7	4		-	33
		Range		485- 535	480- 595		570- 570	540- 605
		Sample Size	0	8	47	0	1	2
7/11 (7/9 - 7/14)	M	Mean Length			593		640	598
		Std. Error			3		10	11
		Range			520- 645		630- 650	580- 625
		Sample Size	0	0	74	0	2	4
	F	Mean Length	570	508	559	500	590	540
		Std. Error	-	8	2	-	-	5
		Range	570- 570	475- 565	480- 590	500- 500	590- 590	535- 545
		Sample Size	1	11	64	1	1	2
7/17 (7/15 - 9/18)	M	Mean Length		528	590	560	585	567
		Std. Error		6	2	5	-	13
		Range		505- 550	540- 630	555- 565	585- 585	545- 590
		Sample Size	0	6	87	2	1	3
	F	Mean Length		489	549	455	575	570
		Std. Error		8	3	-	-	-
		Range		420- 565	495- 605	455- 455	575- 575	570- 570
		Sample Size	0	17	52	1	1	1
Season	M	Mean Length	642	545	597	560	623	592
		Range	635- 650	502- 625	520- 665	555- 565	585- 650	545- 625
		Sample Size	2	19	317	2	7	10
	F	Mean Length	570	503	560	480	582	558
		Range	570- 570	420- 565	480- 645	455- 500	570- 592	535- 605
		Sample Size	1	40	247	2	4	6
Historical	M	Mean Length	582	534	581	539	603	578
		Range	568- 568	525- 610	425- 630	560- 645	470- 700	499- 602
		Sample Size	27	278	1813	38	83	122
	F	Mean Length	547	496	548	490	554	536
		Range	470- 470	429- 597	415- 595	575- 595	438- 635	450- 545
		Sample Size	24	495	1733	61	62	87

Table 8. Age and sex composition of chum salmon escapement at the Middle Fork Goodnews River weir, 2003.

Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class									
			0.2		0.3		0.4		0.5		Total	
			Esc.	%	Esc.	%	Esc.	%	Esc.	%	Esc.	%
6/27 - 7/7 (6/18 - 7/8)	59	M	0	0.0	653	35.6	218	11.8	93	5.1	963	52.5
		F	0	0.0	621	33.9	186	10.2	62	3.4	870	47.5
		Subtotal	0	0.0	1,274	69.5	404	22.0	155	8.5	1,833	100.0
7/9 - 7/11 (7/9 - 7/15)	155	M	0	0.0	2,112	43.9	559	11.6	155	3.2	2,826	58.7
		F	0	0.0	1,646	34.2	280	5.8	62	1.3	1,988	41.3
		Subtotal	0	0.0	3,758	78.1	839	17.4	217	4.5	4,814	100.0
7/17 - 7/19 (7/16 - 7/22)	184	M	0	0.0	3,182	54.9	252	4.4	63	1.1	3,498	60.3
		F	32	0.5	2,017	34.8	252	4.3	0	0.0	2,300	39.7
		Subtotal	32	0.5	5,199	89.7	504	8.7	63	1.1	5,798	100.0
7/24 - 7/26 (7/22 - 9/17)	168	M	55	0.6	3,502	38.1	875	9.5	55	0.6	4,487	48.8
		F	54	6.0	4,541	49.4	110	1.2	0	0.0	4,705	51.2
		Subtotal	109	1.2	8,043	87.5	985	10.7	55	0.6	9,192	100.0
Season	566	M	55	0.3	9,449	43.7	1,904	8.8	366	1.7	11,774	54.4
		F	86	0.4	8,825	40.8	827	3.8	124	0.6	9,863	45.6
		Total	141	0.7	18,274	84.5	2,731	12.6	490	2.3	21,637	100.0
Historical (1990-2003)	4,370	M	712	0.4	57,674	32.3	32,095	18.0	1,010	0.6	91,491	51.3
		F	640	0.4	58,316	32.7	27,758	15.6	228	0.1	86,944	48.7
		Total	1,352	0.8	115,990	65.0	59,853	33.5	1,238	0.7	178,435	100.0

Table 9. Mean length (mm) of chum salmon through the Middle Fork Goodnews River weir, 2003.

Sample Dates (Stratum Dates)	Sex		Age Class			
			0.2	0.3	0.4	0.5
6/27 - 7/7 (6/18 - 7/8)	M	Mean Length		608	634	633
		Std. Error		5	13	8
		Range		555- 655	600- 690	625- 650
		Sample Size	0	21	7	3
	F	Mean Length		572	608	648
		Std. Error		6	19	48
		Range		520- 645	563- 690	600- 695
		Sample Size	0	20	6	2
7/9 - 7/11 (7/9 - 7/15)	M	Mean Length		592	623	619
		Std. Error		4	5	8
		Range		520- 685	575- 675	600- 640
		Sample Size	0	68	18	5
	F	Mean Length		563	574	568
		Std. Error		3	9	8
		Range		515- 610	530- 600	560- 575
		Sample Size	0	53	9	2
7/17 - 7/19 (7/16 - 7/22)	M	Mean Length		585	623	610
		Std. Error		3	6	5
		Range		505- 660	605- 655	605- 615
		Sample Size	0	101	8	2
	F	Mean Length	530	555	575	
		Std. Error	-	3	6	
		Range	530- 530	510- 610	550- 600	
		Sample Size	1	64	8	0
7/24 - 7/26 (7/23 - 9/18)	M	Mean Length	530	570	585	570
		Std. Error	-	3	9	-
		Range	530- 530	500- 640	525- 660	570- 570
		Sample Size	1	64	16	1
	F	Mean Length	500	543	559	
		Std. Error	-	3	29	
		Range	500- 500	500- 620	530- 588	
		Sample Size	1	83	2	0
Season	M	Mean Length	530	582	607	614
		Range	530- 530	500- 685	525- 690	570- 650
		Sample Size	1	254	49	11
	F	Mean Length	511	551	580	608
		Range	500- 530	500- 645	530- 690	560- 695
		Sample Size	2	220	25	4
Historical	F	Mean Length	536	562	583	608
		Range	510- 560	475- 640	470- 675	640- 645
		Sample size	20	1,206	661	6
	M	Mean Length	558	593	619	630
		Range	495- 585	480- 685	515- 710	605- 640
		Sample size	21	1,104	720	24

27

Sample Dates (Stratum Dates)	Sample Size	Sex	Age Class									
			1.1		2.1		2.2		3.1		Total	
			Esc.	%	Esc.	%	Esc.	%	Esc.	%	Esc.	%
8/24 (7/11 - 8/28)	52	M	1,078	5.8	9,338	50.0	0	0.0	1,078	5.8	11,494	61.5
		F	359	1.9	6,106	32.7	0	0.0	718	3.8	7,183	38.5
		Subtotal	1,437	7.7	15,444	82.7	0	0.0	1,796	9.6	18,677	100.0
9/1 (8/29 - 9/5)	59	M	611	3.4	7,024	39.0	0	0.0	1,222	6.8	8,857	49.2
		F	305	1.7	8,857	49.1	0	0.0	0	0.0	9,162	50.8
		Subtotal	916	5.1	15,881	88.1	0	0.0	1,222	6.8	18,019	100.0
9/9 (9/6 - 9/18)	56	M	288	1.8	8,632	53.6	0	0.0	288	1.8	9,208	57.1
		F	0	0.0	6,043	37.5	0	0.0	863	5.3	6,906	42.9
		Subtotal	288	1.8	14,675	91.1	0	0.0	1,151	7.1	16,114	100.0
Season	167	M	1,976	3.7	24,995	47.3	0	0.0	2,587	4.9	29,558	56.0
		F	665	1.3	21,006	39.8	0	0.0	1,581	3.0	23,252	44.0
		Total	2,641	5.0	46,001	87.1	0	0.0	4,168	7.9	52,810	100.0
Historical (1990, 1995 - 2003)	2,952	M	5,436	2.9	86,654	46.9	76	0.0	4,871	2.6	97,038	52.5
		F	3,850	2.1	80,271	43.5	0	0.0	3,567	1.9	87,686	47.5
		Total	9,286	5.0	166,745	90.3	76	0.0	8,438	4.6	184,724	100.0

Table 11. Mean length (mm) of coho salmon at the Middle Fork Goodnews River weir, 2003.

Sample Dates (Stratum Dates)	Sex		Age Class			
			1.1	2.1	2.2	3.1
8/24 (7/11 - 8/28)	M	Mean Length	558	618		628
		Std. Error	43	10		30
		Range	475- 620	485- 690		575- 680
		Sample Size	3	26	0	3
	F	Mean Length	525	621		618
		Std. Error	-	7		3
		Range	525- 525	575- 660		615- 620
		Sample Size	1	17	0	2
9/1 (8/29 - 9/5)	M	Mean Length	533	593		633
		Std. Error	48	10		26
		Range	485- 580	515- 680		595- 710
		Sample Size	2	23	0	4
	F	Mean Length	615	606		
		Std. Error	-	7		
		Range	615- 615	485- 655		
		Sample Size	1	29	0	0
9/9 (9/6 - 9/18)	M	Mean Length	570	619		685
		Std. Error	-	6		-
		Range	570- 570	535- 665		685- 685
		Sample Size	1	30	0	1
	F	Mean Length		599		572
		Std. Error		6		59
		Range		535- 635		460- 660
		Sample Size	0	21	0	3
Season	M	Mean Length	552	611		637
		Range	475- 620	485- 690		575- 710
		Sample Size	6	79	0	8
	F	Mean Length	566	608		592
		Range	525- 615	485- 660		460- 660
		Sample Size	2	67	0	5
Historical	M	Mean Length	568	597		610
		Range	467 - 658	435 - 707		575 - 675
		Sample Size	76	908	0	26
	F	Mean Length	594	599		596
		Range	518 - 677	400 - 680		420 - 625
		Sample size	55	961	0	30

Table 12. Daily climate and hydrological readings, Middle Fork Goodnews River weir, 2003.

Date	Time	Cloud Cover	Wind dir-mph	Precipitation		Air Temp °C		River	
				condition	mm/24hr	current	daily hi/lo	level (cm)	temp. °C
14-Jun	12:00	clear	0		0.0	22	26/na	44	10.5
15-Jun	12:00	scattered	W-10		0.0	22	24/3	39	11.0
16-Jun	12:00	overcast	SE-15		0.0	13		38	11.0
17-Jun	14:30	broken	E-15		0.0	20	22/4	35	11.0
18-Jun	12:10	broken	E-5		0.2	19	22/8	36	10.5
19-Jun	13:30	broken	W-5		0.0	13		35	10.0
20-Jun	16:00	overcast	E-10	light rain	3.2	10	11/8	33	9.5
21-Jun	11:15	broken	0		2.0	13	16/8	33	9.0
22-Jun	12:00	broken	SE-10		0.2	16	24/6	32	10.0
23-Jun	12:00	broken	NE-5	light rain	1.3	15	15/7	30	11.0
24-Jun	12:00	overcast	0		0.6	13		28	9.0
25-Jun	11:45	overcast	S-5	light rain	2.1	9	14/8	28	9.0
26-Jun	13:00	overcast	E-10		3.2	12	16/7	27	9.0
27-Jun	12:00	broken	0		0.0	14	20/2	30	10.0
28-Jun	12:00	overcast	SE-10		0.4	10	11/1	28	9.0
29-Jun	12:00	overcast	0		11.6	12	14/10	28	9.0
30-Jun	12:00	overcast	0	light rain	1.6	12	12/10	28	9.5
1-Jul	12:00	overcast	0	light rain	34.1	12		43	9.0
2-Jul	12:00	overcast	W-20	showers	1.5	12	13/6	45	9.0
3-Jul	12:00	overcast	W-5		1.0	8	15/6	43	9.0
4-Jul	12:00	overcast	S-10		0.0	16	20/5	40	
5-Jul	12:00	overcast	W-5		0.0	8		39	10.0
6-Jul	14:00	overcast	W-10	showers	0.2	10	16/7	37	10.0
7-Jul	13:00	clear	0		0.0	22	27/1	35	10.0
8-Jul	12:00	clear	W-5		0.0	21	25/5	31	13.0
9-Jul	12:00	broken	W-10		0.0	10	18/9	29	11.5
10-Jul	12:00	overcast	W-5	mist	1.0	12	13/8	27	11.5
11-Jul	12:30	overcast	0		1.0	13	17/8	27	11.5
12-Jul	12:00	scattered	0		0.2	18	25/10	29	12.0
13-Jul	12:00	clear	NW-10		0.0	19	23/9	25	12.5
14-Jul	15:00	clear	W-10		0.0	17	21/9	23	13.0
15-Jul	12:00	broken	W-5		0.0	17	21/4	22	13.0
16-Jul	12:00	broken	N-10		0.0	19	21/9	20	13.5
17-Jul	12:00	overcast	E-10	continous rain	11.7	10	14/9	21	11.0
18-Jul	12:00	broken	E-30		0.7	18	20/11	21	10.5
19-Jul	12:00	clear	0		0.0	22	27/3	19	13.0
20-Jul	12:00	scattered	N-10		0.0	22	26/5	17	13.5
21-Jul	12:00	clear	N-10		0.0	20	20/10	15	13.0
22-Jul	12:00	broken	SE-10		0.0	15	22/1	13	13.0
23-Jul	12:00	overcast	S-10	light rain	2.6	13	15/10	14	12.0
24-Jul	12:00	overcast	S-15	light rain	6.8	11	12/9	18	11.0
25-Jul	12:00	broken	E-5		1.1	12	19/9	20	10.0
26-Jul	12:00	overcast	SW-5	showers	1.0	14	16/6	18	11.0
27-Jul	12:00	overcast	SW-10		0.2	11	13/9	17	11.0
28-Jul	12:00	overcast	0	continous rain	20.8	11	13/9	20	10.0
29-Jul	12:00	broken	E-10		2.3	14	19/9	27	10.5

-continued-

Table 12. (Page 2 of 2)

Date	Time	Cloud Cover	Wind dir-mph	Precipitation		Air Temp °C		River	
				condition	mm/24hr	current	daily hi/lo	level (cm)	temp. °C
30-Jul	12:00	overcast	SW-10		0.1	12	14/4	23	11.0
31-Jul	12:00	overcast	SW-5	mist	0.3	12	14/9	21	10.5
1-Aug	12:00	overcast	W-5		0.2	14	15/10	20	11.0
2-Aug	12:00	scattered	0		3.7	13	18/7	20	11.0
3-Aug	12:00	scattered	N-5		0.0	15	18/1	19	12.0
4-Aug	12:00	clear	0		0.0	16	23/1	17	11.0
5-Aug	12:00	clear	ESE-10		0.0	20	24/2	15	12.0
6-Aug	12:00	overcast	S-5		3.5	15	17/12	15	13.0
7-Aug	12:00	scattered	0		6.5	17	23/12	16	13.0
8-Aug	12:00	clear	SW-5		0.0	23	25/6	15	15.0
9-Aug	12:00	broken	SE-10		0.0	22	26/8	14	15.0
10-Aug	12:00	overcast	E-5	continous rain	12.5	15	16/11	16	14.0
11-Aug	15:00	overcast	5		2.5	14	15/10	22	12.0
12-Aug	14:00	overcast	SE-10		38.8	14	15/11	44	11.5
13-Aug	12:00	overcast	S-5		12.4	13	15/11	49	11.0
14-Aug	12:00	overcast	0	continous rain	14.2	13	15/12	58	11.0
15-Aug	12:00	broken	N-10		6.0	12	12/4	66	11.0
16-Aug	12:00	broken	SW-5		0.6	11	15/3	62	9.0
17-Aug	12:30	scattered	SW-5	showers	2.0	12	16/6	58	9.0
18-Aug	12:00	broken	SE-5	showers	2.0	10		54	9.0
19-Aug	11:45	scattered	0		11.2	10		55	9.0
20-Aug	12:00	scattered	NE-10		1.2	11	15/8	56	9.0
21-Aug	12:00	clear	E-5		0.0	11	18/3	49	9.0
22-Aug	13:00	clear	NE-5		0.0	15	18/0	43	9.0
23-Aug	12:00	overcast	0	showers	1.6	10	12/8	40	10.0
24-Aug	12:00	overcast	SW-5		1.2	12	13/8	38	9.0
25-Aug	12:00	overcast	S-5	showers	11.7	12	14/9	40	9.5
26-Aug	12:00	overcast	0		0.5	11	12/8	42	9.0
27-Aug	12:00	broken	E-5		3.3	12	16/6	39	9.0
28-Aug	12:00	scattered	E-5		8.0	13	16/4	37	9.5
29-Aug	12:00	overcast	0		1.0	12	15/6	35	10.0
30-Aug	12:00	overcast	W-5	showers	11.5	13	15/10	35	10.0
31-Aug	12:00	scattered	0		8.0	13	18/10	38	10.0
1-Sep	12:00	broken	W-5		0.0	13	14/6	33	10.0
2-Sep	12:00	scattered	0		0.0	9	15/6	31	10.0
3-Sep	12:00	overcast	0	showers	3.7	11	13/8	30	10.0
4-Sep	12:00	broken	0		4.4	12	14/7	33	10.0
5-Sep	12:00	broken	0		0.9	13	15/3	31	10.0
6-Sep	12:00	scattered	0		0.0	12	18/3	30	9.5
7-Sep	12:00	scattered	0		0.0	12	17/-1	28	10.0
8-Sep	12:00	clear	0		0.0	9	17/0	26	9.0
9-Sep	13:00	scattered	0		0.0	14	16/-1	25	9.0
10-Sep	12:00	clear	0		0.0	12	19/-6	24	8.0
11-Sep	13:00	overcast	0		0.0	12	12/2	22	8.0
12-Sep	12:00	overcast	N-10		0.0	11	13/8	21	9.0
13-Sep	12:00	broken	E-5		0.2	11	12/4	20	9.5
14-Sep	12:00	clear	N-10		0.0	8	13/0	19	7.0
15-Sep	12:00	clear	0		0.0	8	17/-6	18	6.5
16-Sep	12:00	clear	SE-10		0.0	9	18/-4	18	6.5
17-Sep	12:00	clear	0		0.0	5	16/-5	17	6.0
18-Sep	15:00	clear	N-10		0.0	10	16/-7	15	8.0
19-Sep	15:00	scattered	N-20		0.0	9	10/-3	14	7.0
20-Sep					0.0		10/-3		
21-Sep	13:00	clear	0		0.0	9	14/-4	10	5.0
22-Sep	12:00	scattered	NE-5		0.0	7	na/-8	9	5.0

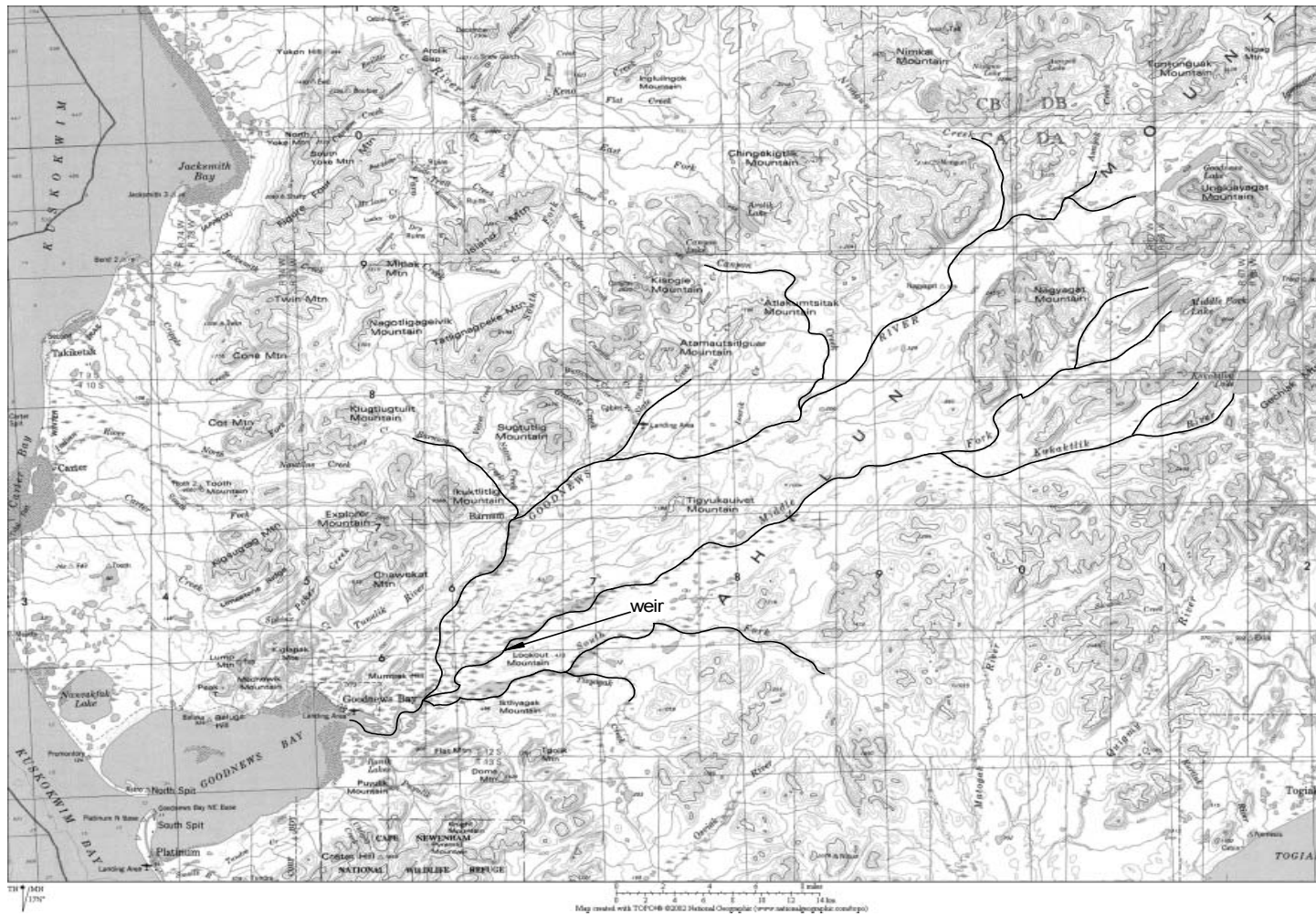


Figure 1. Map of the Goodnews River drainage.

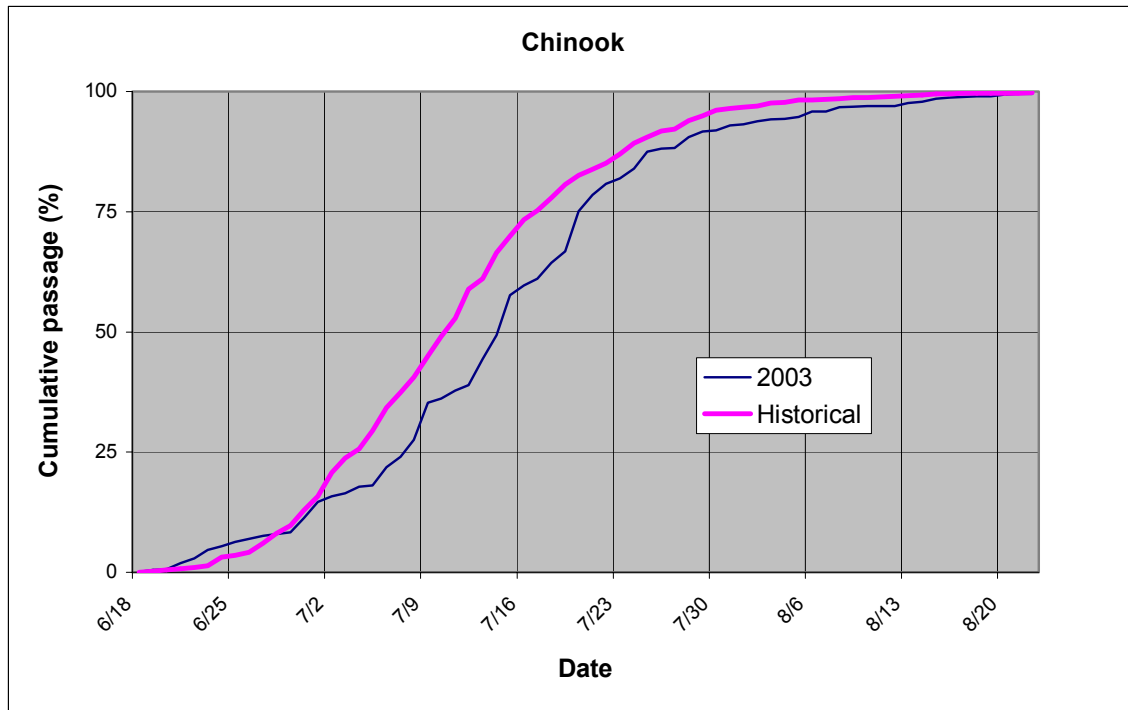


Figure 2. Chinook salmon migration timing at the Middle Fork Goodnews River Weir.

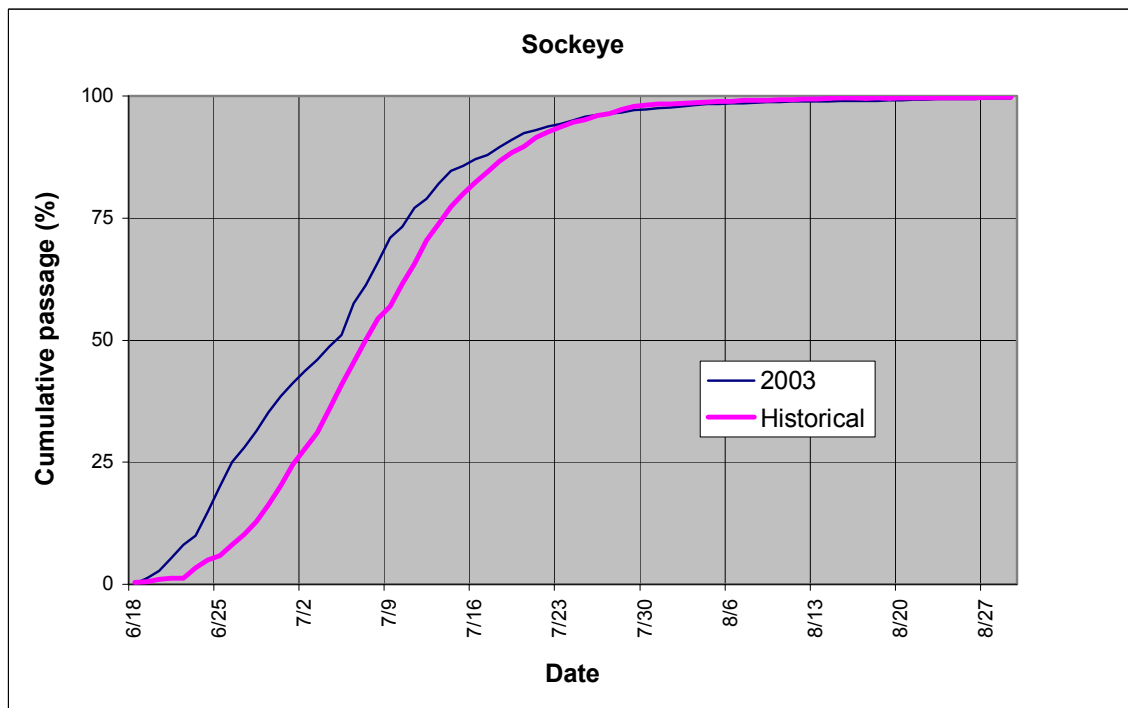


Figure 3. Sockeye salmon migration timing at the Middle Fork Goodnews River Weir.

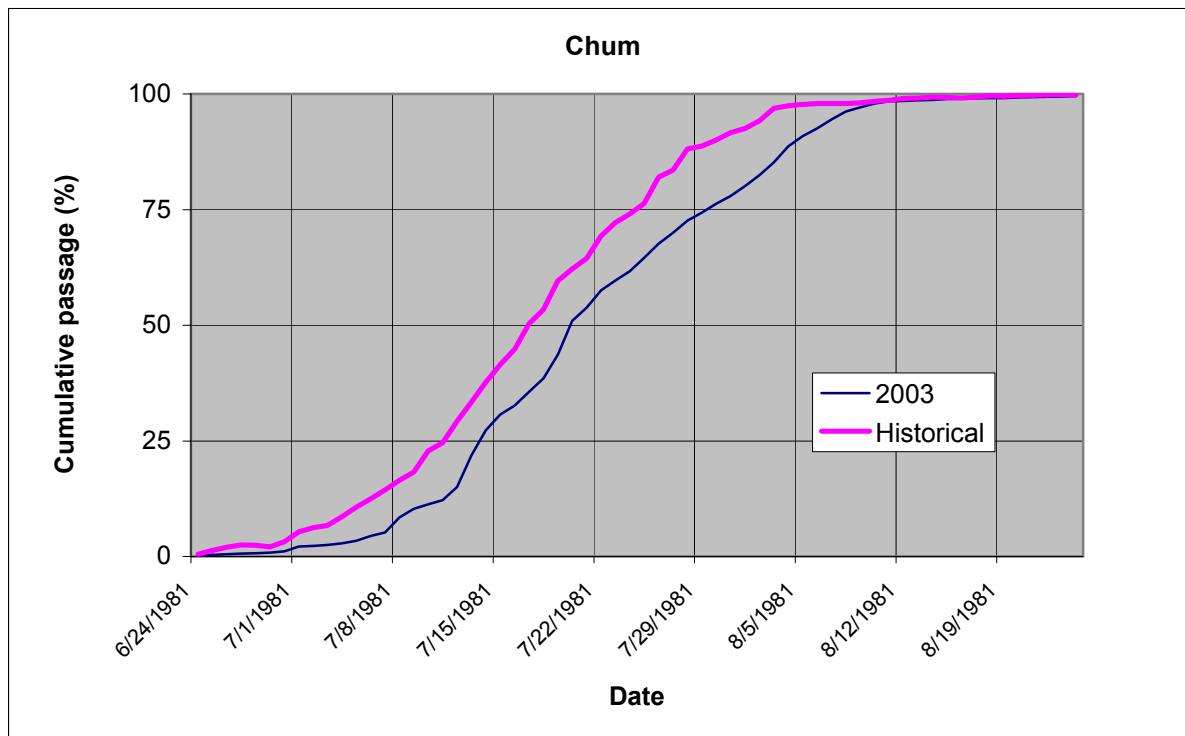


Figure 4. Chum salmon migration timing at the Middle Fork Goodnews River Weir.

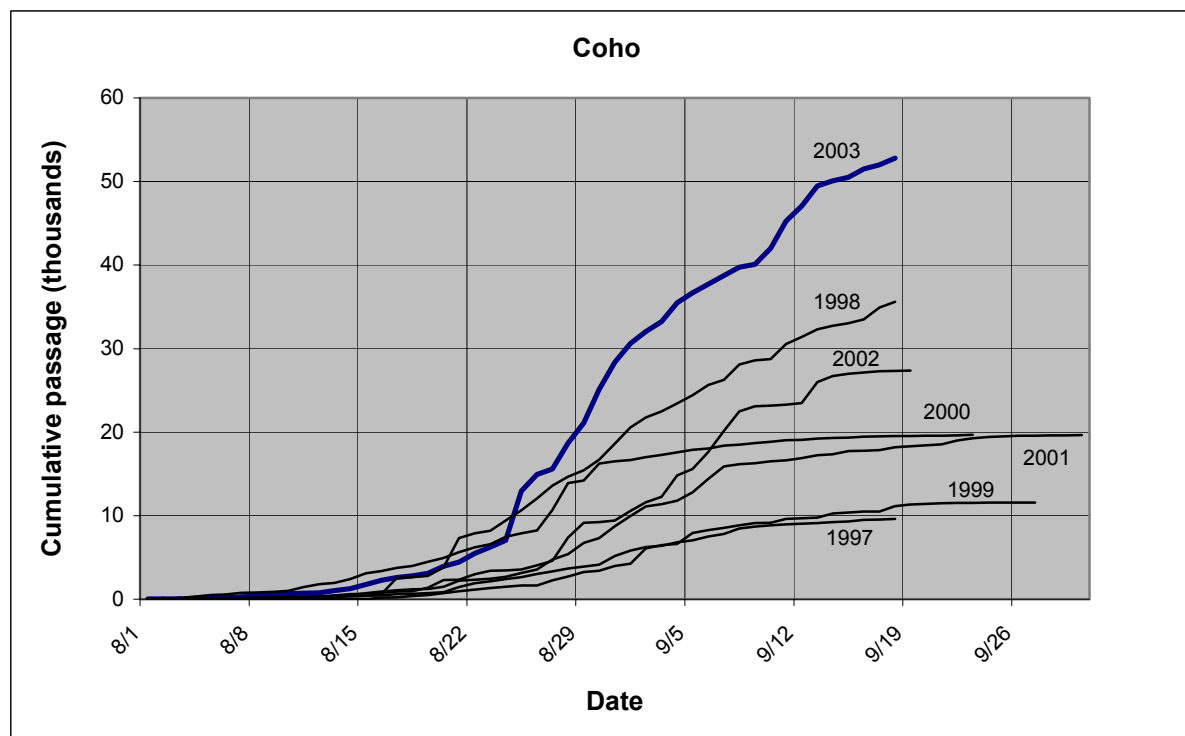


Figure 5. Coho salmon migration timing at the Middle Fork Goodnews River Weir.

APPENDICIES

Appendix A. Escapement summary for the Goodnews River drainage, 2003.

Middle Fork Goodnews River escapement estimate				
	Chinook	Sockeye	Chum	Coho
2003 weir count	2,389	44,387	21,637	52,810
Weir (SEG)	3,500	25,000	15,000	none
10-year avg ('93-'02)	3,649	39,698	26,114	20,377 ^a
2003 aerial survey count	1,210	21,760	2,310	^b
Goodnews River (north fork) escapement estimate				
	Chinook	Sockeye	Chum	Coho
2003 escapement estimate	4,985	55,877	33,039	^b
10-year avg ('93-'02)	6,470	75,165	62,610	^b
2003 aerial survey count	2,015	27,380	3,370	^b
Total escapement estimate				
	Chinook	Sockeye	Chum	Coho
2003	7,374	100,264	54,676	^b
10-year avg ('93-'02)	10,119	114,863	88,724	^b

^a Average last 6 years ('97-'02).

^b No estimate made

Appendix B. Harvest summary for the Goodnews River drainage, 2003.

District W-5 commercial fishery harvest estimate					
	Chinook	Sockeye	Chum	Coho	Total
2003	1,412	29,423	5,593	12,658	49,086
10-year avg ('93-'02)	2,353	34,758	12,217	18,377	69,555

Subsistence fishery harvest estimate					
	Chinook	Sockeye	Chum	Coho	Total
2003	a	a	a	a	a
10-year avg ('93-'02)	657	776	279	514	2,226

Sport fishery harvest estimate					
	Chinook	Sockeye	Chum	Coho	Total
2003	a	a	a	a	a
10-year avg ('93-'02)	254	227	143	520	1,144

Total harvest estimate					
	Chinook	Sockeye	Chum	Coho	Total
2003	2,323 ^b	30,426 ^b	6,018 ^b	13,692 ^b	52,456 ^b
10-year avg ('93-'02)	3,264	35,761	12,693	19,411	72,925

^a Results not available at publication time

^b Last 10 year averages were substituted for 2003 subsistence and sport harvest results, which were not available at publication time.

Appendix C. Estimated total run abundance and exploitation for the Goodnews River drainage, 2003.

Total escapement estimate					
	Chinook	Sockeye	Chum	Coho	
2003	7,374	100,264	54,676	^a	
10-year avg ('93-'02)	10,119	114,863	88,724	^a	

Total harvest estimate					
	Chinook	Sockeye	Chum	Coho	Total
2003	2,323 ^b	30,426 ^b	6,018 ^b	13,692 ^b	52,456 ^b
10-year avg ('93-'02)	3,264	35,761	12,693	19,411	72,925

Total run abundance estimate					
	Chinook	Sockeye	Chum	Coho	Total
2003	9,697 ^b	130,690 ^b	60,691 ^b	^a	^a
10-year avg ('93-'02)	13,344	150,595	101,345	^a	^a

Total exploitation estimate					
	Chinook	Sockeye	Chum	Coho	Total
2003	24% ^b	23% ^b	10% ^b	^a	^a
10-year avg ('93-'02)	24%	24%	13%	^a	^a

^a No estimate made

^b Last 10 year averages were substituted for 2003 subsistence and sport harvest results, which were not available at publication time.

Appendix D. Estimated run size and exploitation rate for Chinook, sockeye, chum, and coho salmon in the GoodnewsRiver drainage, 1981-2003.

Year	Species	MFGR Tower/weir estimate ^a	Goodnews River Escapement	Subsistence Harvest	Commercial Harvest	Sport Harvest ^b	Total Run Size	Exploitation (%)
1981	Chinook	3,688	7,766 ^d	1,409	7,190		20,053	43
	Sockeye	49,108	100,029 ^d	3,511 ^d	40,273		192,921	23
	Chum	21,827	53,799 ^d	-	13,642		89,268	15
1982	Chinook	1,395	2,937 ^d	1,236	9,476		15,044	71
	Sockeye	56,255	114,587 ^d	2,754	38,877		212,473	20
	Chum	6,767	16,679 ^d	-	13,829		37,275	37
1983	Chinook	6,022	14,398	1,066	14,117	31	35,634	43
	Sockeye	25,813	69,955	1,518 ^e	11,716	14	109,016	12
	Chum	15,548	38,323 ^d	-	6,766	10	60,647	11
1984	Chinook	3,260	8,743	629	8,612		21,244	43
	Sockeye	32,053	67,213	964	15,474		115,704	14
	Chum	19,003	117,739	189	14,340		151,271	10
1985	Chinook	2,831	7,979	426	5,793	323	17,352	38
	Sockeye	24,131	50,481	704	6,698	75	82,089	9
	Chum	10,367	25,025	348	4,784	124	40,648	13
1986	Chinook	2,092	4,094	555	2,723		9,464	35
	Sockeye	51,069	93,228	942	25,112	122	170,473	15
	Chum	14,764	51,910	191	10,355		77,220	14
1987	Chinook	2,272	4,490	816	3,357		10,935	38
	Sockeye	28,871	51,989	955	27,758	266	109,839	26
	Chum	17,517	37,802	578	20,381		76,278	27
1988	Chinook	2,712	5,419	310	4,964		13,405	39
	Sockeye	15,799	38,319	1065	36,368		91,551	41
	Chum	20,799	39,501	448	33,059		93,807	36
1989	Chinook	1,915	2,891	467	2,966	68	8,307	42
	Sockeye	21,186	35,476	869	19,299	146	76,976	26
	Chum	10,380	15,495	760	13,622	0	40,257	36
1990	Chinook	3,636	7,656 ^d	682	3,303		15,277	26
	Sockeye	31,679	64,528 ^d	905	35,823		132,935	28
	Chum	6,410	15,799 ^d	342	13,194		35,745	38
1991	Chinook	1,952	4,521 ^d	682	912	29	8,096	20
	Sockeye	47,397	96,544 ^d	900	39,838	163	184,842	22
	Chum	27,525	67,844 ^d	106	15,892	215	111,582	14

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Appendix D. (Page 2 of 3)

Year	Species	MFGR Tower/weir estimate ^a	Goodnews River Escapement	Subsistence Harvest	Commercial Harvest	Sport Harvest ^b	Total Run Size	Exploitation ^c (%)
1992	Chinook	1,903	1,854	252	3,528		7,537	50
	Sockeye	27,268	52,501	905	39,194		119,868	33
	Chum	22,023	16,084	662	18,520		57,289	33
1993	chinook	2,349	4,727 ^d	488	2,117	104	9,785	28
	sockeye	26,452	54,325 ^d	572	59,293	69	140,711	43
	chum	14,952	38,061 ^d	133	10,657	202	64,011	17
1994	chinook	3,856	7,866 ^d	657	2,570	175	15,124	22
	sockeye	55,751	115,405 ^d	652	69,490	80	241,378	29
	chum	34,849	91,653 ^d	402	28,477	34	155,415	19
1995	chinook	4,836	9,865 ^d	552	2,922	55	18,230	19
	sockeye	39,009	80,749 ^d	787	37,351	53	157,949	24
	chum	33,699	88,628 ^d	329	19,832	16	142,504	14
1996	chinook	2,930	5,977 ^d	526	1,375	213	11,021	19
	sockeye	58,264	120,606 ^d	763	30,717	143	210,493	15
	chum	40,450	106,384 ^d	326	11,093	18	158,271	7
1997	chinook	2,937	7,216	449	2,039	164	12,641	20
	sockeye	35,530	23,462	609	31,451	142	91,052	35
	chum	17,296	45,488 ^d	133	11,729	80	74,646	16
	coho	9,611	^f	397	2,983	855	13,846	
1998	chinook	4,584	3,797	718	3,675	590	13,364	37
	sockeye	47,951	14,693	508	27,161	672	90,985	31
	chum	28,905	24,940 ^f	316	14,155	198	68,514	21
	coho	34,441		331	21,246	574	56,592	
1999	chinook	3,221	6,565 ^d	871	1,888	414	12,959	24
	sockeye	48,205	99,727 ^d	872	22,910	661	172,375	14
	chum	19,533	51,361 ^d	281	11,562	425	83,162	15
	coho	11,545	^f	582	2,474	789	15,390	
2000	chinook	3,295	6,458 ^d	601	4,442	319	15,115	35
	sockeye	42,197	73,845 ^d	1,028	37,252	132	154,454	25
	chum	14,720	35,475 ^d	280	7,450	224	58,149	14
	coho	19,676	^f	517	15,531	795	36,519	
2001	chinook	5,404	8,128	853	1,519	285	16,189	16
	sockeye	22,495	137,364	914	25,654	164	186,591	14
	chum	26,829	33,902 ^f	181	3,412	130	64,454	6
	coho	19,626		616	9,275	822	30,339	

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Appendix D. (Page 3 of 3)

Year	Species	MFGR Tower/weir estimate ^a	Goodnews River Escapement	Subsistence Harvest	Commercial Harvest	Sport Harvest ^b	Total Run Size	Exploitation ^c (%)
2002	chinook	3,076	4,096	857	979	224	9,008	23
	sockeye	21,127	31,476	1,050	6,304	149	59,957	13
	chum	29,905	110,215 ^f	407	3,799	99	144,326	3
	coho	27,364		297	3,041	429	30,702	
2003	chinook	2,389	4,985	^g	1,412	^g	8,786	^g
	sockeye	44,387	55,877	^g	29,423	^g	129,687	^g
	chum	21,637	33,039	^g	5,593	^g	60,269	^g
	coho	52,810	^f	^g	12,658	^g	65,468	^g

^a Goodnews Tower Project changed to weir project in 1991.

^b Sport fish harvest is the number of fish harvested plus 5 % of the total fish caught, to account for a 5 % delayed mortality.

^c Commercial, subsistence, and sport harvest exploitation.

^d Average Middle Fork/Goodnews River escapement estimate ratio for 1983-1989 used to estimate Goodnews River escapement in years when no aerial survey of the Goodnews River was flown.

^e Subsistence caught chum salmon is included in subsistence sockeye salmon harvest

^f Survey was not flown for coho salmon.

^g Unavailable at the time of publication.